PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of | Docket No: Q88723

Yasuo MIZOTA

Appln. No.: 10/540,552 | Group Art Unit: 1791

Confirmation No.: 5361 | Examiner: Geoffrey L. Knable

Filed: August 2, 2005

For: TIRE STRUCTURAL MEMBER FABRICATING METHOD AND APPARATUS FOR CARRYING OUT THE SAME

SUBMISSION OF APPEAL BRIEF

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

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Respectfully submitted,

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Date: October 15, 2008

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For: TIRE STRUCTURAL MEMBER FABRICATING METHOD AND APPARATUS FOR CARRYING OUT THE SAME

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 41.37, Appellant submits the following:

Table of Contents

I. REAL PARTY IN INTEREST 2
II. RELATED APPEALS AND INTERFERENCES 3
III. STATUS OF CLAIMS 4
IV. STATUS OF AMENDMENTS 5
V. SUMMARY OF THE CLAIMED SUBJECT MATTER 6
VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL 10
VII. ARGUMENT 11
CLAIMS APPENDIX 18
EVIDENCE APPENDIX: 22
RELATED PROCEEDINGS APPENDIX 23

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Bridgestone Corporation of Tokyo, Japan, the assignee. The assignment was recorded on August 2, 2005, at Reel 016887, Frame 0279.

II. RELATED APPEALS AND INTERFERENCES

A Notice of Appeal was filed on August 15, 2008, in response to the Advisory Action dated July, 28 2008.

There are no other appeals or interferences known to Appellant, Appellant's legal representative, or the assignee that will directly affect or be directly affected by, or have a bearing on, the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-6 are pending in the present application and stand finally rejected and are being appealed.

In the Final Office Action of May 15, 2008, the Examiner made the following rejections:

- Claims 1-6 were rejected 35 U.S.C. § 103(a) as being unpatentable over Ogawa et al. (U.S. 6,461,459; hereinafter "Ogawa") in view of Marchini et al. (U.S. 6,702,913; hereinafter "Marchini") and Hitotsuyanagi et al. (US 2002/0046796; henceforth "Hitotsuyanagi").
- Claims 1-6 were rejected under 35 U.S.C. § 102(e) as being anticipated by or, in the alternative, under 35 U.S.C.§103(a) as obvious under Ohkubo (US 2003/0024627).

In the Advisory Action of July 28, 2008, the Examiner withdrew the rejections based on Ohkubo (US 2003/0024627) based on the arguments and statements set forth in the response under 35 U.S.C. §1.116 filed July 15, 2008.

Claims 1-6 remain rejected under 35 U.S.C. § 103(a) as being unpatentable over Ogawa et al. (U.S. 6,461,459; hereinafter "Ogawa") in view of Marchini et al. (U.S. 6,702,913; hereinafter "Marchini") and Hitotsuyanagi et al. (US 2002/0046796; henceforth "Hitotsuyanagi").

No other ground of rejection or objection is currently pending.

A copy of the pending claims on appeal is set forth in the attached Appendix.

IV. STATUS OF AMENDMENTS

An Amendment Under 37 C.F.R. § 1.111 was filed February 13, 2008, in response to the Non-final Office Action dated October 17, 2007. Claims 1 and 4 were amended.

A Response Under 37 C.F.R. § 1.116 was filed July 15, 2008, in response to the Final Office Action dated May 15, 2008. No Amendments were made.

A Notice of Appeal was filed on August 15, 2008, in response to the Advisory Action dated July 28, 2008.

All amendments and arguments are believed to have been previously entered and made of record.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Appellant's invention as recited in, for example, independent claim 1, is directed to a method for fabricating a tire structural member by attaching strips to a convex outer surface having an outwardly convex cross section of a forming drum. Applicant's invention is also directed to an apparatus for fabricating a tire structural member.

In the prior art, a convex cylindrical drum having a curved outer surface with an outward convex cross section was used to form the tire structural member. As described in the present specification, these drums have a larger diameter at the middle part of the convex cross section than at the outer parts. *See* Appellant's specification, page 2, line 24-page 3, line 1. Therefore when a number of strips are successively attached, such that middle parts of the strips are properly adjoining, the end parts of the strips overlap. *See* Appellant's specification, page 3, lines 1-4. Similarly, when a number of strips are attached successively, such that end parts of the strips are properly enjoining, gaps are formed between adjacent middle parts. *See* Appellant's specification, page 3, lines 5-7. In either case, a uniform quality structural member cannot be formed.

Therefore, exemplary embodiments of the present invention address the problems of the prior art. Specifically, an exemplary embodiment of the present invention makes it possible to produce a structural member having uniform quality.

Claim 1

Claim 1 is directed to a tire structural member fabricating method, which fabricates a tire structural member (*See* Appellant's specification, page 10, lines 12-14; element 3 in Fig. 4) by successively and contiguously attaching strips (*See* Appellant's Specification, page 10, lines 15-

16; element 1, Figs. 1 through 6, and Fig. 8-1) to a convex outer surface having an outwardly convex cross section of a forming drum (*See* Appellant's specification, page 10, lines 16-18; and page 10, line 22-page 11, line 3; element 11, Figs. 1-4) by a strip feed device such that the strips extend obliquely to a center axis of the forming drum(*See* Appellant's specification, page 11, lines 4-7; element 21, Fig 1), said method comprising the steps of:

continuously attaching strips (1) to the convex outer surface of the forming drum (11) (*See* Appellant's specification, page 13, lines 19-23) by successively feeding strips (1) onto the convex outer surface by the strip feed device (21) (*See* Appellant's specification, page 13, lines 15-18), while the strip feed device (21) is being moved parallel to the center axis of the forming drum (11) (*See* Appellant's specification, page 11, lines 9-10) relative to the forming drum (11) at a fixed speed from an axial end of the forming drum (11) to another end thereof and while the forming drum (11) is being rotated about the center axis thereof (*See* Appellant's specification page 13, lines 13-15); and

controlling the rotation of the forming drum (11) such that the angular velocity of the forming drum (11) varies gradually and continuously from a minimum angular velocity at a moment a leading end of the strip (1) is attached to the convex outer surface of the forming drum (11) to a maximum angular velocity at a moment the strip (1) is attached to a middle part of the convex outer surface of the forming drum (11) and from the maximum angular velocity to a minimum angular velocity at a moment a trailing end of the strip (1) is attached to the convex outer surface of the forming drum (11), the minimum angular velocity at the moment the trailing end is attached being equal to the minimum angular velocity at the moment the leading end is attached (*See* Appellant's specification, page 14, lines 7-18).

Claim 4

Claim 4 is directed to a tire structural member fabricating apparatus comprising: a forming drum (element 11, Figs. 1 through 4) having a convex outer surface having an outwardly convex cross section and supported for rotation about a center axis (c, Fig. 1) thereof (*See* Appellant's specification, page 10, line 22-page 11, line 3);

a drum driving device (element 13, Figs 1) for rotating the forming drum(11) (*See* Appellant's specification, page 11, lines 2-3);

a strip feed device (element 21, Fig. 1) for moving from an axial end of the forming drum (11) to another end thereof (*See* Appellant's specification, page 11, lines 4-7; page 12, lines 23-25) and for successively feeding strips (element 1, Figs. 1 through 6 and 8-1) and successively attaching the strips (1) to the forming drum (11) (*See* Appellant's specification, page 13, lines 15-18) such that the strips (1) are arranged successively and contiguously in a circumferential direction and are extended obliquely to the center axis of the forming drum(*See* Appellant's specification, page 13, lines 12-18); and

a moving device (element 25, Fig 1) for moving the strip feed device (21) relative to the forming drum parallel to the center axis of the forming drum (*See* Appellant's specification, page 11, lines 6-13);

wherein the moving device (25) includes a strip feed device driving motor (element 28, Fig. 1) for moving the strip feed device (21) at a fixed speed (*See* Appellant's specification, page 11, lines 9-14; page 14, lines 1-3),

the drum driving device (13) includes a drum driving motor (13) (*See* Appellant's specification, page 11, lines 2-3), and

a controller (element 40, Fig. 1) connected to the strip feed device driving motor(28) and the drum driving motor (13), the controller (40) is controlling the strip feed device driving motor (28) and the drum driving motor (13) such that angular velocity of the forming drum (11) varies gradually and continuously from a minimum angular velocity at a moment a leading end of the strip (1) is attached to the convex outer surface of the forming drum (11) to a maximum angular velocity at a moment the strip (1) is attached to a middle part of the convex outer surface of the forming drum (11) and from the maximum angular velocity to a minimum angular velocity at a moment a trailing end of the strip (1) is attached to the convex outer surface of the forming drum (11), the minimum angular velocity at the moment the trailing end is attached being equal to the minimum angular velocity at the moment the leading end is attached. (*See* Appellant's specification, page 13, line 24-page 14, line 18)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Rejection of claims 1-6 under 35 U.S.C. § 103(a) as being unpatentable over Ogawa in view of Marchini and Hitotsuyanagi.

VII. ARGUMENT

Claims 1-6 are patentable over Ogawa taken in view of Marchini and Hitotsuyanagi.

Claims 1 and 4

In the Amendment filed on February 13, 2008, Appellant argued that Ogawa does not teach or even suggest specific control of the rotation of the drum about the tire's rotational axis from minimum to maximum velocities relative to a fixed lateral movement speed as recited in claim 1. Further, Appellant argued that Marchini teaches a relative angular rotation is realized by either actuating a strip laying unit relative to the toroidal support or rotating the toroidal support about an axis of correction Y-Y (which is perpendicular to the rotational axis of the tire), and does not teach varying the rotational speed of the toroidal support about the rotational axis of the tire as recited in claim 1. Appellant also argued that Hitotsuyanagi also does not cure the deficiencies of Ogawa and Marchini because it does not teach gradually and continuously varying the drum rotational speed from a minimum value to a maximum value because Fig. 3 clearly shows the intermediate region having inclined straight parallel lines indicating the drum's rotational speed was constant in this region. Further, Appellant argued that the manner of variation of the forming drum is substantially different because it is designed to apply ply-cords to a simple cylindrical drum surface and not a crowned drum portion as described in the present claims. For these reasons, Appellant argued that a person of ordinary skill in the art would not be motivated to use the inventive principles of Marchini or Hitotsuyanagi in the method/apparatus of Ogawa.

Examiner's Arguments from Final Office Action

In response to these arguments, the Examiner acknowledges that Marchini does not teach the strip applying methodology claimed or even the methodology taught in Ogawa. However, the Examiner asserts that Marchini and Ogawa both teach forming a tire belt with successively applied strips. The Examiner also asserts that Marchini identifies that for a crowned drum, the length of the circumference at the equatorial plane will be longer than the length of the circumference at the lateral edges and it is therefore impossible to advantageously adjoin one another at both the equatorial plane and the lateral edges. The Examiner also asserts that Marchini solves this problem and that combined with Ogawa make it obvious to control the speeds relative to one another to yield the angle variation shown in Marchini. In other words, the Examiner asserts that Marchini does not teach the application method claimed but generally teaches varying the angular path of each strip which would have been understood as applying to belt strips of a crowned drum or any other tire belt formed by successive application of strips regardless of the specific application process.

With respect to Hitotsuyanagi, the Examiner also asserts that this reference makes it obvious to control the drum of Ogawa during rotation to be at a maximum rotational velocity at the center of the tire width and smaller at the edges in order to form the cord path suggested by Marchini. Appellant respectfully submits that the Examiner has misconstrued the applied references.

Appellant's Response

I. A person of ordinary skill in the art would not combine the references as suggested by the Examiner.

Ogawa does not teach the specific control of the rotation of the drum to gradually and continuously vary from a minimum to a maximum velocity relative to a fixed lateral movement speed as claimed. In other words, Ogawa teaches continuously attaching strips from one axial end of the drum to another axial end of the drum, but does not teach gradually and continuously varying the angular velocity of the drum as claimed.

Conversely, Marchini teaches that applying the strips from one axial end of the tire to the other axial end of the tire (as is taught in Ogawa), while rotating the tire about its rotational axis, can cause gaps to be formed between adjacent strips resulting in non-homogeneity in the reinforcing structure. *See* Col. 2 line 66-Col. 3, line 2. In other words, Marchini teaches that the process described in Ogawa is disadvantageous due to the above described problems. Therefore, Marchini instead teaches that to guarantee perfect structural homogeneity in the reinforcing structure there must be a relative rotation brought about between the toroidal support and the reinforcing strip, about the axis of correction Y-Y (which is shown in Figs. 3 and 4 to correspond not with the rotational axis of the tire, but the radial axis of the tire). *See* Col. 3, lines 3-17. In other words, Marchini teaches that to generate homogeneity in the reinforcing structure, the reinforcing strip must be rotated about the radial axis of the toroidal support. Marchini also teaches that strips should be applied from the center of the tire's width outward to the axial ends and not from one axial end to the other axial end if non-homogeneity is to be avoided.

Appellant submits that the Marchini and Ogawa references teach dramatically different methods of manufacturing a reinforcing structure of the tire. Ogawa teaches applying strips from one axial end to the other axial end while rotating the tire about its rotational axis of the tire, while Marchini teaches applying strips from the center of the tire's width outward to the axial ends while rotating the tire about its radial axis (not its rotational axis). Further, Marchini teaches that the method used in Ogawa is flawed and must be replaced with the entirely different method taught in Marchini. Therefore, Appellant submits that a person of ordinary skill in the would not apply the teachings of Marchini to Ogawa, but would instead simply adopt the method taught by Marchini (i.e. generating a rotation about the tire's radial axis and applying the strips from the center of the tire's width outward to the axial ends). Therefore, Appellant submits that a person of ordinary skill in the art would not combine the teachings of Marchini and Ogawa as asserted by the Examiner.

II. The applied references do not teach the claimed rotation.

Further, in Marchini, the toroidal support 3 on which the strip-like segments 5 are applied is rotated about its axis X-X (Fig. 5) of rotation (column 7, lines 64-67) by a predetermined angular pitch. This incremental rotation of the toroidal support 3 is carried out to bring the toroidal support 3 to a rotational position adapted to receive a new strip-like segment 5 adjacent to an old strip-like segment 5 which has already been applied to the toroidal support 3. For this reason, the incremental rotation of the toroidal support 3 is an "indexing" rotation, which is not equivalent to the controlled-speed rotation of the forming drum, as recited in the present claims, for the purpose of successively arranging strips so that adjacent strips are in properly adjoining disposition. Further, it should be noted that, Marchini et al. uses relative rotation between the

strip-like segment 5 and the toroidal support 3 about an axis Y-Y (Fig.5) extending radially of the toroidal support 3 to position adjoining strips. This is quite different from the specific controlled-speed rotation of the forming drum as claimed in the present application.

Further, with respect to the Hitotsuyanagi reference, Appellant submits that Hitotsuyanagi teaches applying a reinforcing cord to a toroidal support having a cylindrical shape and not a crowned shape. Further, Appellant submits that Hitotsuyanagi teaches applying the cords at an angle by rotating the toroidal support at **a constant rotational** velocity, but does not teaching varying the chord's angle by **continuously varying the rotational velocity** of the toroidal support as recited in the present independent claims 1 and 4.

While it is true that to go from a dead stop to "a constant rotational velocity" a brief acceleration must be applied in Hitotsuyanagi, this acceleration is not a controlled change of velocity as recited in claims 1 and 4, but an uncontrolled velocity change which must be carried out to start the constant velocity rotation of the drum. The same is true for the deceleration from the constant rotational velocity to a dead stop which must also occur. Therefore, Appellant submits that the Examiner's assertion that Hitotsuyanagi teaches varying the angles by continuously varying the speed of the drum during the traverse of the feed device is improper.

Appellant further points out that the apparatus and method of Hitotsuyanagi are directed to applying ply cords to the rotation drum, whereas the method and apparatus of the present invention are directed to application of strips. Furthermore, the object of the invention of Hitotsuyanagi is to realize changes of the disposition angle of the ply cords halfway in a widthwise direction to realize a predetermined bending angle, whereas the object of the invention of this application is to successively arrange strips so that adjacent strips are in properly

adjoining disposition. Therefore, Appellant submits that the teachings of Hitotsuyanagi cannot be a motivation of the present invention.

Examiner's arguments in the Advisory Action and Appellant's response

In the Advisory Action of July 28, 2008, the Examiner asserted that "Ogawa suggests that the inclination angle 'can be appropriately selected by adjusting the rotational speed of the core and the lateral displacement speed of the crosshead relative to each other". *See* Contuation of 11, page 2. The Examiner further asserted that Marchini "clearly suggests that what this angle should be when the cord strips are to be applied to a convex or crowned drum" and further asserts "appropriate adjustments of the relative speeds needed to achieve this would have been readily apparent". *Id.* Appellant respectfully submits that the Examiner continues to misconstrue the applied references.

As discussed above, Marchini teaches that the method of applying strips taught by Ogawa produces an inferior reinforcing structure and that to overcome these defects it is necessary to use a entirely different method in which a relative rotation is brought about between the toroidal support and the reinforcing strip, about the axis of correction Y-Y, (which is shown in Figs. 3 and 4 to correspond not with the rotational axis of the tire, but the radial axis of the tire). *See* Col. 2, line 66-Col. 3, line 10. In light of the express teachings of Marchini, Appellant respectfully submits that a person of ordinary skill in the art would not have modified the method of Ogawa as suggested by the Examiner, but would have instead adopted the method taught by Marchini. Therefore, Appellant submits that it would not be obvious to combine the applied references as the Examiner has suggested.

For the above discussed reasons, Appellant submits that independent claims 1 and 4 are patentable over the applied references. Appellant further submits that dependant claims 2, 3, 5, and 6 recite additional unique features which are not taught or even suggested in the references applied by the Examiner. Therefore, Appellant submits that these claims are also patentable for these additional reasons.

VIII. CONCLUSION

Unless a check is submitted herewith for the fee required under 37 C.F.R. §41.37(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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Date: October 15, 2008

CLAIMS APPENDIX

CLAIMS 1-6 ON APPEAL:

1. A tire structural member fabricating method, which fabricates a tire structural member by successively and contiguously attaching strips to a convex outer surface having an outwardly convex cross section of a forming drum by a strip feed device such that the strips extend obliquely to a center axis of the forming drum, said method comprising the steps of:

continuously attaching strips to the convex outer surface of the forming drum by successively feeding strips onto the convex outer surface by the strip feed device, while the strip feed device is being moved parallel to the center axis of the forming drum relative to the forming drum at a fixed speed from an axial end of the forming drum to another end thereof and while the forming drum is being rotated about the center axis thereof; and

controlling the rotation of the forming drum such that the angular velocity of the forming drum varies gradually and continuously from a minimum angular velocity at a moment a leading end of the strip is attached to the convex outer surface of the forming drum to a maximum angular velocity at a moment the strip is attached to a middle part of the convex outer surface of the forming drum and from the maximum angular velocity to a minimum angular velocity at a moment a trailing end of the strip is attached to the convex outer surface of the forming drum, the minimum angular velocity at the moment the trailing end is attached being equal to the minimum angular velocity at the moment the leading end is attached.

2. The tire structural member fabricating method according to claim 1, wherein the step of controlling the rotation of the forming drum controls the rotation of the forming roller so that the forming drum rotates at angular velocity ω meeting relation expressed by:

$$\tan^{-1}\left(\frac{r\omega}{V}\right) = \cos^{-1}\left(\frac{nw}{2\pi r}\right)$$

where **w** is a width of the strips, **n** is the number of the strips, V is the fixed speed of the strip feed device, and **r** is the radius of the convex outer surface of the forming drum as a function of a distance along the center axis of the forming drum by which the strip feed device travels.

3. The tire structural member fabricating method according to claim 1, wherein each of the strips is given opposite oblique ends inclined at an angle of $\cos^{-1}(nw/2\pi r_0)$_to a direction in which the strip is fed, where r_0 is the radius of the opposite ends of the forming drum, where **w** is a width of the strips and **n** is the number of the strips.

4. A tire structural member fabricating apparatus comprising:

a forming drum having a convex outer surface having an outwardly convex cross section and supported for rotation about a center axis thereof;

a drum driving device for rotating the forming drum;

a strip feed device for moving from an axial end of the forming drum to another end thereof and for successively feeding strips and successively attaching the strips to the forming drum such that the strips are arranged successively and contiguously in a circumferential direction and are extended obliquely to the center axis of the forming drum; and

a moving device for moving the strip feed device relative to the forming drum parallel to the center axis of the forming drum;

wherein the moving device includes a strip feed device driving motor for moving the strip feed device at a fixed speed,

the drum driving device includes a drum driving motor, and

a controller connected to the strip feed device driving motor and the drum driving motor, the controller is controlling the strip feed device driving motor and the drum driving motor such that angular velocity of the forming drum varies gradually and continuously from a minimum angular velocity at a moment a leading end of the strip is attached to the convex outer surface of the forming drum to a maximum angular velocity at a moment the strip is attached to a middle part of the convex outer surface of the forming drum and from the maximum angular velocity to a minimum angular velocity at a moment a trailing end of the strip is attached to the convex outer surface of the forming drum, the minimum angular velocity at the moment the trailing end is attached being equal to the minimum angular velocity at the moment the leading end is attached.

5. The tire structural member fabricating apparatus according to claim 4, wherein the controller controls rotation of the forming drum so that the forming drum rotates at angular velocity ω meeting relation expressed by:

$$\tan^{-1}\left(\frac{r\omega}{V}\right) = \cos^{-1}\left(\frac{nw}{2\pi r}\right)$$

where **w** is a width of the strips, **n** is the number of the strips, V is the fixed speed of the strip feed device and **r** is the radius of the convex outer surface of the forming drum as a function of distance along the center axis of the forming drum by which the strip feed device travels.

6. The tire structural member fabricating method according to claim 2, wherein each of the strips is given opposite oblique ends inclined at an angle of

$\cos^{-1}(nw/2\pi r_0)$ to a direction in which the strip is fed, where r_0 is the radius of the opposite ends of the forming drum.

EVIDENCE APPENDIX:

Pursuant to 37 C.F.R. § 41.37(c)(1)(ix), submitted herewith are copies of any evidence submitted pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132 or any other evidence entered by the Examiner and relied upon by Appellant in the appeal.

NONE

RELATED PROCEEDINGS APPENDIX

Submitted herewith are copies of decisions rendered by a court or the Board in any proceeding identified about in Section II pursuant to 37 C.F.R. § 41.37(c)(1)(ii).

NONE